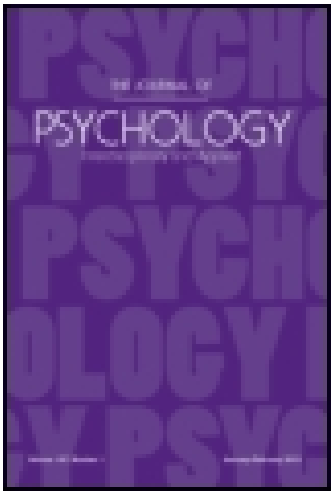

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A CASE OF EXPERIMENTAL NEUROSIS AND RECOVERY IN RELATION TO THE ORIENTING RESPONSE*

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This report is concerned with the development of an experimental neurosis in one male dog (Schnapps) and his recovery as brought about by mild electric shocks. While this dog has been mentioned elsewhere (7), no detailed report of his behavior has been made. It is believed that the behavior is of sufficient theoretical value to warrant a complete report.

Schnapps was one of four dogs undergoing preliminary training for an autonomic conditioning experiment (1, 2). The preliminary (preconditioning) training consisted of (*a*) habituation to the experimental room and the Pavlovian type stand, and (*b*) orienting training.

Any mild or moderate stimulus causes an animal to direct his appropriate receptors into the most favorable position for receiving the stimulus. In the case of an auditory stimulus, the dog turns his head in the direction of the signal and pricks up his ears. There is nearly always a noticeable change in respiration, and the dog occasionally licks his chops. In 1910, Pavlov (5) termed this directional movement the orienting reflex (*OR*). At first, he was only concerned with controlling the *OR*, since it interfered with the conditional response. The sound-shielded conditioning chamber was constructed to reduce the interference of the extraneous stimuli invariably present in a conditioning laboratory: a sudden gust of air, a speck of plaster falling from the ceiling, accidental noises, etc. Pavlov gradually came to see, however, that the *OR* was an important bit of behavior in itself, and in 1916, he discussed inquisitiveness as an elaboration of the *OR* (5).

In 1947, Robinson and Gantt (6) reported that the *OR* in dogs has both motor and autonomic components. They studied the changes in heart rate (*HR*), respiration, and salivation in addition to the directed motor movement.

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Most stimuli that are to be used as conditional stimuli elicit the *OR*, and it is generally desirable to extinguish the *OR* before initiating the reinforcement procedure. In the *OR* phase of the autonomic study mentioned above, the dogs were given 5 to 15 repetitions of each of three nonreinforced tones/day for 20 to 30 daily sessions. The tones were 256, 512, and 1024 dvs, and the interval between tones was two minutes. Each tone lasted five seconds, and the order of presentation was always the same, T-256, T-512, and T-1024.

The purpose of the study was to compare the rate of formation of cardiac and motor conditioned responses, and it was desirable to approximate the intensities of the unconditioned stimuli prior to the reinforcement procedure (2). During the middle of the orienting training, several electrical stimuli were administered to the dogs at the end of two daily *OR* sessions (following the tones). All the dogs were to receive moderate electrical stimuli.

As a result of difficulties in the electrical circuit, Schnapps was accidentally given on the first day of the approximation procedure three electrical stimuli of a very high intensity (120 volts, 60 cycle, a.c.). Each stimulus lasted from two to five seconds, and the interval between stimuli was approximately five minutes. While the stimuli were applied to the left forepaw, the current radiated to the cardiac electrodes. These electrodes were located on the two sides of the animal's body, one anterior and the other posterior to the heart.

Schnapps had received 253 nonreinforced repetitions of the three tones prior to the session in which the electrical stimuli were administered. His behavior was relatively unstable during the early *OR* sessions as compared with the other animals. He alternated through successive periods of excitability and somnolence. But the *OR* had largely extinguished (both the motor and cardiac components) prior to the approximation procedure. The behavior of Schnapps to the electrical stimuli and in the sessions after these stimuli is summarized below.

Each electrical stimulus produced an immediate withdrawal reaction followed by struggling. The duration of the struggling increased with the successive stimuli, and the animal struggled for about five minutes following the third shock. The experimenter (*E*) entered the conditioning chamber after each stimulus attempting to determine the source of difficulty in the electrical circuit. Schnapps' struggling behavior disappeared at the sight of *E* after the first two shocks, but not after the third.

The first shock resulted in piloerection and an odor of feces. After the struggling subsided, the animal withdrew to the back of the conditioning stand. He held up his stimulated paw for several seconds. He again raised

his paw to the second shock and held it up during the third shock and for several minutes thereafter, except during the bursts of struggling. Each beat of the heart was distinctly visible through the abdominal wall, and while *HR* was not recorded it was estimated to be about 190 to 200 beats/minute. The animal urinated and defecated to the second shock and vomited to the third shock. A sexual erection was noted following the third shock. For the first time, the dog refused to eat on leaving the conditioning stand.

On the day following the electrical stimuli, Schnapps was more restless than usual and his *HR* was accelerated (see Figure 1). The dog again refused to eat following the *OR* procedure. His behavior was interpreted as a mild upset, and the striking changes that followed were not expected.

During the next 24 days Schnapps' behavior became more pathological: (*a*) Heart rate in the experimental room increased during the next few days reaching a maximum of about 153 beats/minute. (*b*) Restlessness gradually increased and gave way to struggling on the 11th post-shock day. (*c*) A muscular tremor developed in the upper muscles of the shocked foreleg on the 12th post-shock day. (*d*) On the 14th post-shock day the animal began to hold the stimulated forepaw up for variable periods of time. (*e*) On the 18th post-shock day the animal for the first time exhibited signs of fear on seeing *E* and the animal caretaker. He crouched in the corner of the kennel with his tail between his legs, and he was hesitant to leave the kennels. (*f*) The animal refused to come to the experimental room on the 22nd day by way of the stairs, but showed no hesitance about the coming by elevator. Normally, the animals were brought to the experimental room by way of the elevator; but when the elevator was busy, the stairs were used. (*g*) Urination, defecation, vomiting, and sexual erections appeared on the 24th day.

The above behaviors intensified once they appeared, and when a new behavior appeared it persisted. Within any one daily session the order of appearance of the behaviors approximately paralleled the order in which they emerged on a day-to-day basis. It is to be noted that certain new reactions not present at the time of the electrical stimuli developed: fear of *E*, the animal keeper, and the stairs.

E's concern throughout all of this was that of attempting to salvage the dog for conditioning experiments. During the 24-day period during which these pathological symptoms appeared and intensified, numerous attempts were made to extinguish the pathological behavior. Special food and care were given, multiple daily sessions were run, and the experiments were conducted with the door to the conditioning room open.

The animal was moved to another conditioning chamber on the 21st post-shock day, and the usual orienting session was conducted by other staff members. The motor and cardiac components of the *OR* were exaggerated in this novel room, as compared with pre-shock behavior, but the dog behaved well, and his *HR* was appreciably lower than on the previous day (see Figure 1). On the 24th post-shock day, white lights (10 repetitions) were substituted for the usual tones, and this resulted in an even greater intensification of the previously observed pathological behavior. Schnapps vomited six times, defecated twice, urinated several times, and exhibited several sexual erections. Vomiting and sexual erections were also observed during the next two-day period when the usual *OR* procedure was resumed.

At this point, "extinction" was attempted by giving a series of mild electrical shocks. On the first day of this procedure, the animal was given 15 mild stimuli at one-minute intervals. The stimuli were regulated to produce a consistent but barely observable flexion response. The animal became remarkably quiescent after the first five or six stimuli and ate several dog biscuits after leaving the conditioning stand. This was the first time he had eaten in the experimental room since the traumatic shocks.

On the next day, 20 mild stimuli were given. Struggling had disappeared and the *HR* was decreased. Schnapps did not attempt to avoid *E* in the kennel this day. The two-day procedure of mild stimulation, which Whitehorn (7) has called a reassurance of mildness, completely reversed within one week all the pathological behavior except the animal's hesitation about coming to the experimental room by way of the stairs. This latter behavior persisted until his death about a year later. Schnapps was sufficiently improved that he could be used in the conditioning phase of the investigation; and his conditioning records were comparable to the other animals except that his *HR* was somewhat higher during the first 200 trials (1).

Figure 1 presents the mean *HR*'s for Schnapps in various sessions preceding and following the electrical stimuli. The *HR*'s to the three tones were pooled and a trial refers to one repetition of the three tones. It may be seen that the cardiac component of the *OR* was increased following the traumatic stimulation for a number of sessions. This suggests that the *OR* may serve as an indicator of the emotional state, and this hypothesis has been recently tested in humans (3).

The electrical circuit was repaired before the other three animals were stimulated, and while they received shocks of a sufficient intensity to cause them to whine, the intensities of these shocks were a fraction of the intensity

received by Schnapps. This procedure had the effect of increasing the *HR* of these dogs to the tones, but this was restricted to the first session following the electrical stimulation. The extinction of the *OR* continued with only a transitory interruption.

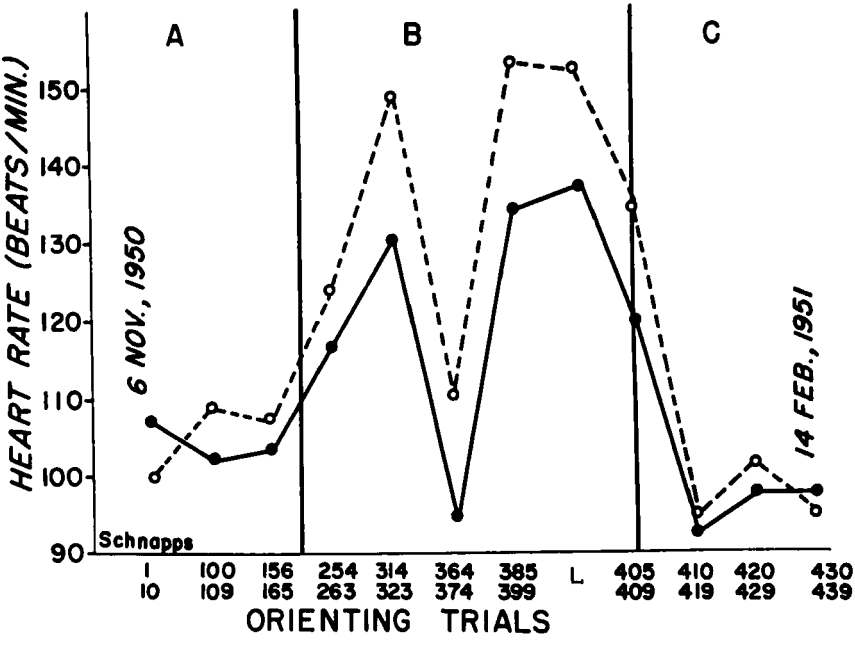

FIGURE 1

Mean *HR*'s for various sessions preceding (A) and following (B) the traumatic electrical stimuli and for various sessions during and following the mild electrical stimuli (C). For this presentation the *HR*'s to the three tones were pooled. The solid line refers to the five-second prestimulus period and the dotted line to the five-second stimulus period. The abscissa indicates the specific trials from which the prestimulus and stimulus means are derived. Trials 254 - 263 occurred on the first post-shock day; Trials 364 - 374 were given in a different room; *L* refers to a session in which a white light was substituted for the usual tones; and Trials 405 - 409 were given after the last series of mild electrical stimuli, on the same day.

The development of pathological behavior such as has been described for Schnapps is termed autokinesis (2, 4). This refers to the spontaneous evolution of new behavior in the absence of further "prepotent" stimulation; in the present case, the electrical stimuli. It has been theorized that autokinesis may be maladaptive or adaptive as in the pathological behavior of Schnapps following the traumatic stimuli and his adjustment following the mild stimuli.

Summary

This report has described the pathological behavior of one dog as produced by traumatic electrical stimuli and his subsequent recovery as a result of mild or reassuring shocks. Three other dogs given stimuli lesser in intensity failed to develop pathological symptoms. Data on the cardiac component of the orienting response have been presented, and these data suggest that this response is exaggerated by emotional upsets.

References

1. Dykman, R. A., & Gantt, W. H. Relation of experimental tachycardia to amplitude of motor activity and intensity of motivating stimulus. *Amer. J. Physiol.*, 1956, **185**, 495-498.
2. Dykman, R. A., Gantt, W. H., & Whitehorn, J. C. Conditioning as emotional sensitization and differentiation. *Psychol. Monog.*, 1956, **70**, 1-17.
3. Dykman, R. A., Reese, W. C., Galbrecht, C. R., & Thomasson, P. J. Psychophysiological reactions to novel stimuli: Measurement, adaptation, and relationship of psychological and physiological variables in the normal human. *Ann. N. Y. Acad. Sciences*, 1959, **79**, 43-107.
4. Gantt, W. H. Principles of nervous breakdown—schizokinesis and autokinesis. *Ann. N. Y. Acad. Sciences*, 1953, **56**, 143-163.
5. Pavlov, I. P. Lectures on Conditioned Reflexes. (Trans. by W. H. Gantt.) New York: International Publishers, 1928.
6. Robinson, J., & Gantt, W. H. The orienting reflex (questioning reaction): cardiac, respiratory, salivary, and motor components. *Bull. Johns Hopkins Hosp.*, 1947, **80**, 231-253.
7. Whitehorn, J. C. Introduction and survey of the problems of stress. In *Symposium on Stress*. Washington, D. C.: Army Medical Center Graduate School, Walter Reed Army Medical Center, 1953.

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